Mr.Gary Payton
Under Secretary of the Air Force for Space Programs
Media Teleconference (Pentagon)
X-37B Launch

2:40-3:30 p.m., 20 April 2010

Mr. Payton: It's an exciting time for me personally. I was working at NASA Headquarters when NASA started the X37 program back in the late '90s. So after a tumultuous history of sponsorship, it's great to see the X37 finally get to the launch pad and get into space.

As you probably understood, the primary objectives of the X37 is a new batch of reusable technologies for America's future plus learning and demonstrating the concept of operations for reusable experimental payloads. Take a payload up, spend up to 270 days on orbit. They'll run experiments to see if the new technology works, then bring it all back home and inspect it to see what was really going on in space. So this is a new way for the Air Force to conduct experiments and we're really excited about that.

With that as an overview, let me turn it back to Angie so we can get on with the questions.

Question: This is Alissa Chang from the Associated Press.

My question is, when is the expected landing date? I understand that it's coming back to Vandenberg. Will we be able to cover there?

Mr. Payton: Yeah, Vandenberg is the primary landing site, Edwards is the backup. Edwards has, of course, the large dry lake bed. In all honesty, we don't know when it's coming back for sure. It depends on the progress that we make with the on-orbit experiments, the on-orbit demonstrations. So the top priority technology demonstration is, on this first flight is the vehicle itself. Getting it into orbit, getting the payload bay doors upon, solar array deployed, learning about on-orbit attitude control, and then bringing it all back. And so we'll have a set of test objectives for the on-orbit activities, but the vehicle itself, proving that the vehicle itself can get up in space, do a job, get back down. And then probably the most important demonstration is again on the ground. Once we get the bird back, see what it really takes to turn this bird around and

get it ready to go fly again, to learn payload change-out on the ground, to learn how much it really costs to do this turn-around on the ground with these new technologies on the X37 itself.

So it's as much a ground experiment in low cost O&M, ops and maintenance, the low cost ops and maintenance on the ground as it is an on-orbit experiment with the vehicle itself.

Question: Mark Matthews with the Orlando Sentinel.

Two quick questions. If the tests are successful is the Air Force looking to be able to build more of these planes? And what do you say to concerns about how this could lead to the increased weaponization of space?

Mr. Payton: We do have a second tail number on contract. Currently we're looking at a 2011 launch for that second tail number. That assumes everything goes properly as predicted on this first flight. And truthfully, I don't know how this could be called wedaponizatino of space. It's just an updated version of the space shuttle kind of activities in space. We, the Air Force, have a suite of military missions in space and this new vehicle could potentially help us do those missions better.

Question: Gordon Lubold, Christian Science Monitor.

I guess I would just wonder if you could explain a little bit more about what the flight will test and clarify one thing. Is there not going to be a specific payload on it this time, or is there going to be and you can't tell us what it's going to be? Can you give us some sense of it? There seems to be a lot of mystery around the flight and I'm not sure if that's intended or not.

Mr. Payton: Like in many of our space launches, not all of them but many of them, the actual on-orbit activities we do classify. So we're doing that in this case for the actual experimental payloads that are on orbit with the X37. But again, our top priority is demonstrating the vehicle itself with its autonomous flight control systems, new generation of silica tile, and a wealth of other new technologies that are sort of one generation beyond the shuttle.

Question: But when it does come back down, what are the questions we should be asking, whenever that is. What are the questions we should be asking you as to whether it was successful or not? What are the things you'll be looking for?

Mr. Payton: The top priority is an inexpensive turn-around. Can we do these new technologies, perform properly on orbit, and get the bird back on the ground? Do we have to do a lot of tile replacement, like we had to see early in the shuttle era. Do we have to do a lot of servicing? If that's the case it makes this sort of vehicle less attractive to us in the future.

Question: Turner Britton, Space News.

I've only ever seen the outside of this spacecraft. Is it similar to the shuttle with a bay on its back that opens up? Does it have some kind of catcher arm?

Mr. Payton: This particular flight there is no arm on it. I don't even know if we've designed an arm for it. It has a payload bay similar to the shuttle. Unlike the shuttle it does not have a fuel cell power system. It's got solar arrays plus lithium ion batteries, whereas the shuttle has hydrogen/oxygen fuel cells. So there are some differences. But the basic configuration is very very similar to the shuttle.

Question: It could capture a spacecraft that's already on orbit and bring it down for servicing or what have you?

Mr. Payton: Not on this flight. Again, this flight's intend is the experiments themselves, both during ascent, during entry, and on orbit. But there's no arm on this one.

Question: Irene Klotz, Reuters.

I was looking at your resume and it reminded me a little bit about all the times a lot of us have probably run across your path. And it seems a lot like memory lane for a reusable launch vehicle. I'm wondering if you might just talk a little bit about how you intend to not have this vehicle come to the same fate as all the others, and if there's also any plan to

scale this up for any vehicle that might be useful in a civil space program as well. Thanks.

Mr. Payton: Clearly, I use the term piece part technology at the level of electromechanical actuators, and flight control subsystems and the tiles. There could be application to other designs, to other vehicles. We chose this basic design back in the late '90s because it shares pretty much the same outer mold line as the space shuttle, and a lot of the subsonic, supersonic, and hypersonic environments we could trace right from the shuttle to this design. So it's easy to rely on the shuttle's aerodynamic knowledge base for this particular design. Again, the piece part technologies, subsystem technologies, could be applied to any number of future systems. For instance, just lithium ion batteries. There have been a few cases where satellites have been designed and flown with lithium ion batteries, but they are the newest sort of power storage technology that we're using in space, so this again expands the knowledge base on lithium ion batteries.

So it's a wealth of different subsystems that could be applied to any design, and this first bird and the second bird will prove all those. Again, the intent of X33, X34 and X37 were really to see if new technologies could ease the turnaround between flights, lower the O&M costs, lower the cost of ownership for these kinds of reusable systems.

Question: Michelle Spencer, Florida Today.

I have two questions. First, can you talk about the cost of this mission? And second, can you talk about any concerns you have regarding weather and how that meets the mission?

Mr. Payton: I can't talk about cost because I don't know the answer. [Laughter]. If you stretched all the way back to 1998, because NASA Spent money on it, Boeing spent their own research and development money on it, DARPA spent money on it, then the Air Force took over. So all those numbers, I have no idea what they add up to.

Weather, do we have somebody from the weather shop on board with us?

Mr. Clay Flynn: The weather does look good for launch Thursday evening, sir. We'll have high pressure building in with fair skies. Winds are below lift-off constraints. We should have winds off the water from the East at 12 knots gusting to 16 and just scattered [cloud] conditions. So it looks pretty favorable for launch. We'll just be watching for any development of cumulous clouds and looking for 20 percent chance of violation or 80 percent favorable conditions, sir.

Mr. Payton: Excellent. And I show about a 1952 liftoff time, is that right?

Voice: [Inaudible].

Major Blair: Michelle, were you referring to the weather for the launch or were you referring to weather impact on the system itself?

Question: I was referring to the launch, but if there's another answer --

Major Blair: No, that's okay. I just wanted to make sure that we were understanding your question clearly.

Mr. Payton: There is a good point there. That gets to the operational nature of these kinds of systems. Early in the shuttle era if the space shuttle was out on the pad, Pad 39, and a thunderstorm came through and rained on the shuttle, the tiles would absorb a huge amount of moisture and that actually added weight to the launch. The amount kind of surprised NASA early in its experience. These tiles that we have on this bird, plus the more modern tiles that the shuttle program has doesn't allow that much absorption of moisture.

Again, this bird will be inside a payload faring for a multitude of reasons, so it won't be exposed to the weather conditions the way the shuttle is.

Question: Leonard David, Space.Com.

I'm must curious on a couple of little points. You're talking about a turn-around time. What's your hope for a turn-

around time? What would be the most advantageous for the project?

Mr. Payton: We used to talk a week for birds like the X34 and such. If we were in a surge environment where we were putting up a whole bunch of satellites all at once over the course of a month or two kind of like an operational responsive space scenario. If we were talking a surge of small satellites, again, I would like to see this X37 handled much more like an airplane, maybe an SR-71. Not an F-16, but an SR-71 probably. Handled more like that than what we see with other space launch mechanisms, space launch vehicles.

Again, I don't think we've set any specific goal, but I would think handling this bird more like an SR-71 and less like a routine space launch vehicle would be a good objective. That's measured in several days, maybe 10, 15 days or less, something like that.

Question: A quick follow-up. On reentry this thing, as far as I can tell, there's no control over it from the ground. It's on its own. Do you have a go/no-go? What kind of abort capability do you have if it somehow is not living up to the landing specs?

Mr. Payton: In fact I talked to some range safety folks earlier today. Let me rephrase that. People with range safety experience. This bird, we will send commands to it to close up the solar array and the payload bay doors and all that, and then tell it to do a D over burn at a certain time. Then it's on autopilot, literally, the entire time the rest of the way in. But it does have, range safety will be tracking it over the Pacific and it does have a destruct mechanism on it.

I do not know the exact method for range destruct, but it does have a technique for range destruct during entry.

Question: This is Michael Sirak with Air Force Magazine.

The Air Force and the DoD space community have two important events this week. One, X37, but also the anticipated launch of the first Hypersonic Test Vehicle 2. So I was hoping you could kind of compare and contrast what you will learn with

those missions, and specifically state if there's anything from X37 that will help your knowledge base as far as Prompt Global Strike, and if there's anything from HTV2 that will help your knowledge base as far as reusable space access.

Mr. Payton: A good point. The HTV as it's titled, is a hypersonic test vehicle. If you just look at the design of the two vehicles, the HTV has a much better hypersonic lift over drag than the X37 or the shuttle has. So that gives it much better cross range at high altitudes and high mach numbers. So that's the dominant difference between the two. X37 has a different sort of thermo protection system on the outside because the environment that it goes through is much different than what the HTV would go through.

Both of them, again, getting back to things like flight control algorithms, getting to electromechanical actuators, those kinds of again, subsystem technologies are probably valuable to share results with, but again, the shape of the vehicle itself is dramatically different because cross range is so important to the hypersonic test vehicle.

Question: Thank you, and a quick follow. Is there any chance that the second flight of this first X37 vehicle could come before the first flight of the second X37 vehicle that you said is planned roughly in 2011?

Mr. Payton: The current plan is not to do that, and it's mostly to do with the on-orbit duration. We may be ready to launch the second tail number while the first one is still up in orbit, but we don't want to do that until we get the first bird on the ground so that if we need to make changes to the second bird as a result of that first vehicle's entry, then we can still do that.

Question: Graham Warwick, Aviation Week.

Can I just understand, how is the vehicle being operated, where is it being operated from, and what level of operator involvement is there in the vehicle when it's on orbit?

Mr. Payton: We're going to get to orbit like any other Atlas or Delta payload. The rocket will be on its own guidance

system, all the way into orbit and then deploy the X37. Then ground controllers will control the X37 just like any other satellite, monitoring the subsystems and telling it what to do. And then the reentry activity is, again, pretty much -- It's going to be significantly different than the shuttle because the real time human control won't be there every single instant of the orbit preps and de-orbit burn and then reentry. It will rely again on its own autopilot, its own gyroscopes, its own GPS receivers, and eventually its own altimeter. I forgot if it uses a laser altimeter or a radar altimeter for landing.

So it will be on its own all the way through entry and landing. That's dramatically different than the way the shuttle does it. But by and large when it's on orbit we'll fly as if it was just another satellite.

Question: John Croft, Flight International.

Can you talk a little about what I presume is a kick motor on the back of the vehicle, and what is new and different about the attitude control algorithms that you've been throwing out?

Mr. Payton: It's just a regular hydrazine propulsion system. It's not anything new and different in that regard. Again, the flight controls are the electromechanical actuators that run the elavons and the rudders and such and lower the landing gear, instead of hydraulic subsystem. Then the autonomous algorithms for reentry. That's what's new and different.

Question: Just to follow up, are you working anything toward on-orbit capture or on-orbit docking with other vehicles like the international space station?

Mr. Payton: No. We're not working on that.

Question: Bill Harwood, CBS.

You've been talking about the shuttle heritage in a sense. I'm just curious on your entry, on the software, on the controlled entry, can you tell us anything about the testing you've done to validate it and what commonality it has, if any,

with other existing systems, or was this developed from the ground up for you guys? Thanks.

Mr. Payton: Similar to the mid '70s when NASA did the approach and landing test, there was a test article that we dropped from helicopter flights that did, again, the subsonic energy management aligned with the runway based on GPS signals, lower the landing gear at a certain altitude all by itself, then land on the center of the runway, and then apply braking. So all that was done autonomously on several helicopter flights, [unpowered] flights from helicopters. And that was, again, along the same mentality that NASA used back in the mid '70s with the shuttle Enterprise.

Relative to the longer term from the D over burn to this point where the bird turned subsonic. This program was started by the folks in Seal Beach who did the same development for the space shuttle so it uses the same sort of energy management techniques that the shuttle uses.

Question: Steven Kwag with [State Fontanel].

Earlier there was mentioned speculation, sort of the mystery surrounding this flight. I know that's nothing new for the military but it does seem a little bit different this time. I was wondering if Gary could comment on that and is he comfortable with that or is that sort of tuned out? Does he focus on operations?

Mr. Payton: Well, you can't hide a space launch, so at some point extra security doesn't do you any good. So it doesn't bother me because I grew up in the era when the Air Force and NASA were launching military things on the shuttle. So I'm accustomed to keeping things secret. And the main thing we want to emphasize is the vehicle itself, on this flight. The main thing we want to emphasize is the vehicle itself, not so much what's going on during the on-orbit experimental phase. Because the vehicle itself is the piece of news here, and again, if we can keep the O&M costs on these birds low, then we have a much more flexible space architecture, I think.

Question: I have one follow-up for you. Have there been any design changes since the Air Force got a hold of the program

from DARPA and NASA? Or are we heavily based almost entirely based on what NASA and DARPA [inaudible]?

Mr. Payton: Again, we want to capitalize on the work that NASA and DARPA did, predominantly from the aerodynamics perspective. That was our main intent.

This bird has been through all of the shake, rattle and roll, the vibration tests, the acoustic tests that any spacecraft would go through, so we were focused on keeping as much commonality with the prior work that NASA and DARPA had done, keeping that and just assembling this vehicle and then sending it through the rigorous environments so that we'd have confidence that it would work.

Question: Bruce Ralston, Air Force Times.

Where will the aircraft be controlled at? Where will your mission control be? Which wing or organization in the Air Force will be handling that?

Also I wanted to ask, I know earlier you couldn't discuss the cost, but what is the contracted cost for the model that's still due, if that's considered public?

Mr. Payton: Again, I don't know. It's all lumped in with our classified budget, so I honestly don't know what the second tail number is predicted to cost.

The flight will be managed by Air Force Space Command's 3rd Space Experimental Squadron, blue suiters out of Space Command.

Since this is a new experiment we haven't established a stand-alone unique ground control operation out in Colorado Springs. I suppose that might be on our agenda sometime in the future. This organization called the 3rd Space Experimental Squadron is running the show for us.

Question: Space News.

You are working on the FY12 budget build right now. Is it likely that we'll see a program of record next time around?

Mr. Payton: I think it will still be inside our classified budget. The people with the right clearances will see it, but not the media, unfortunately. Assuming the security system works right.

Question: Orlando Sentinel.

Two questions. I wanted to see, will the X37B have the ability to rendezvous with other crafted orbits? With satellites? I just wonder about the capability that you guys are looking to test. And will it have the ability to operate autonomously in orbit?

Mr. Payton: The on-orbit autonomy parallels our typical satellite operation. We send commands to it to do stuff or se send timed commands to it to do something at a particular time. So that's the way we handle all satellites. This flight does not have any rendezvous and prax ops objectives.

Question: Reuters.

I was just wondering what's involved in clearing airspace for this vehicle's return to California, and what information you're going to be releasing during the in-flight and landing phases of the mission?

Mr. Payton: I don't know of any planned press releases or anything for in-flight. It will be handled with the FAA probably exactly the way NASA handles the shuttle return. It will take pretty much, again, similar to the shuttle, it will take half the world to come home. The FAA, we'll work with the FAA to clear the appropriate airspace. Send out notems and such.

Question: Are there any special concerns since it's an unmanned vehicle?

Mr. Payton: No, not really. Not in my mind. Redundant flight control systems, redundant digital flight control systems have come a dramatic long way since the days of the early '70s when NASA was designing the space shuttle. If you fly in a 777 or a 787 you'll be flying on an airplane that's got redundant digital fly-by-wire flight control system, certain Airbus airplanes. So technology maturity for digital fly-by-wire has

come a long way in the last 30 years after NASA's initial development. I've got a lot of confidence in the ability of this bird to come back home autonomously.

Question: Space.Com.

I'm curious, you mentioned tail number two. What's your druthers given some budget? Would you envision a fleet of these things beyond two? What number would you look at?

Mr. Payton: Leonard, that all depends on the success of these first two birds. Is the O&M cost low? Can we turn them around between flights easily? Admittedly, these birds don't carry our biggest satellites like AEHF and SBIRS and all that, but again, they can do a very good job on our smaller satellites. And if they are low cost O&M, from an O&M perspective, they could be a big part of our future.

Question: A quick follow-up on in-orbit capability. Do you have, what kind of props on this thing? I know you can get up to like 500 nautical miles, something like that. Is there any expectation to do some orbit maneuvering of this vehicle to different altitudes?

Mr. Payton: Just the way we handle satellites in general. We would, and like we handle low earth orbit satellites. We move them a little bit with their own on-board propulsion system.

You're starting to touch on the notion of using a winged vehicle to really change the inclination of the orbit by sort of dipping into the top of the atmosphere and turning and then bouncing back up off the top of the atmosphere. You need a very very good, very very high. Again, hypersonic lift over drag, in order for that to be beneficial. This bird does not have that high hypersonic lift over drag ratio that you would need to do that kind of maneuver.

Sorry, I didn't intend to give a lecture on Aero 562.

Question: That's okay. And the prop on board is what?

Mr. Payton: Just regular hydrazine.

Question: Air Force Magazine.

You talked before about how this could handle a small sized satellite. In more lay person's terms, what does that mean? Is the payload large enough to hold like a Volkswagen Beetle or an SUV? Can you give us some idea there?

Mr. Payton: You know our ORS program, Operation Responsive Space?

Question: Yes.

Mr. Payton: Maybe a couple of satellites that are a few hundred kilograms each.

Question: Aviation Week.

Can I just confirm something? You said that the second vehicle may be ready to launch before the first vehicle is back from it's -- This is not a short hop. This is a long journey, a planned long flight.

Mr. Payton: Right. We have a maximum of 270 days on orbit with this bird. Again, we don't want to launch the second one until we've learned everything we can from the first one. So we will keep the second one on the ground until the first one comes home.

Again, that may be, it won't be any more than 270 days but again, it all depends on the progress of the on-orbit experiments, then we'll make a conscious decision on the success of those on-orbit experiments before we bring it home.

Question: Have you manifested the second vehicle launch yet?

Mr. Payton: No, not yet. That's one of the things we're trying to get better at is the assignment of launch opportunities to individual payloads and do that later, closer to launch than we currently do. But that's for all EELVs and Minotaurs and everything. That's not unique to X37.

Question: Flight International.

Given the expense of going through this reusable vehicle, what type of interest is there in the Air Force in particular of bringing back payloads as opposed to just dropping them off?

Mr. Payton: The advantage of this vehicle is that you can take something up that's new, you haven't ever flown it before, it's new technology, and operate it on orbit, then bring it back and inspect it. Kind of a truck mode. You take it up and bring it back all in the same flight over the course of weeks or months. Shuttle has a limit of I believe 16 days on orbit. This bird can go a lot longer than 16 days.

Question: Air Force Times.

I'd ask the lieutenant colonel down there at the Cape, how is launching this spacecraft different than your standard satellite launches as far as preparations and precautions? I was curious. For example, even if similar to the space shuttle, if you have to look at down range landings, since you have an aircraft that can land, if there was an emergency you could bring it down before it goes into orbit.

Voice: I would say that in general it's very similar to processing other spacecraft. We use a lot of the same facilities and processes for processing this particular vehicle compared to other typical spacecraft. What is unique is we have worked with the 30th Space Wing folks as well to work the other launch sites, [inaudible] available for the test flights. We have been coordinating extensively with them. Typical launches, obviously we're really limited to the eastern range on most other spacecraft. But in general, it's actually very similar. And I'll say that the processing for the vehicle went very smooth for a first reusable test vehicle, first time ever done. We've had no delays in processing. It's been a very good vehicle to work with.

Question: Is there any provision, if there's some sort of malfunction and it can't get to orbit for it to land somewhere downrange?

Voice: I can't really comment on that. I don't know anything about that.

Question: Reuters.

I was wondering if you might comment about the Air Force's space strategy and how that fits into the plan that President Obama has laid out for NASA?

Major Blair: In the interest of time here, this telecom is for X37 launch. If you'd like a comment on that you can go ahead and email me and I can help you out from that, if you'd like a statement from Mr. Payton.

If anyone has follow-ons for the X37 launch, go ahead.

Question: Air Force Magazine.

Mr. Payton, what are the best adjectives to use to describe this mission? Is it revolutionary? How should we describe it?

Mr. Payton: I don't know. I'm an engineer, not an English major. I would say that, again, if these technologies on the vehicle prove to be as good as we currently estimate, it will make our space launch, our access to space more responsive, perhaps cheaper, and again, push us in the vector toward being able to react to warfighter needs more quickly.

Question: Turner Britton.

This is probably a dumb question. I guess I just don't really get the final intent of the mission you're looking for here. An Atlas 5 launch costs $200 million or something. So I can't really figure out why you would want to take something up to orbit, test it, and bring it down, when you can kind of simulate all those things on the ground. The only thing that really makes sense to me is the ability to go up and get a spacecraft, maybe one that's failed, bring it down, fix it, or see what went wrong and put it back up there. Am I on the right track there?

Mr. Payton: Project a spacecraft or new technology that we haven't flown before and we want to expose it to that space

environment and test again, not the X37, in the future not the X37 itself, but the stuff it carries. Test that new technology on orbit in the real world and then bring it back and inspect it. That's one of the big advantages this bird offers. And you get to expose that new technology for a long time on orbit. Again, not just a week or two weeks on orbit, but for a long time.

Question: Space.Com.

You started out talking about your NASA days with X33 and some of the other X vehicles. One of the things that never really quite showed up at least in my mind in X33 was the self maintenance, self health check so when it got back down to the ground you could really move along the turn-around time. Does this vehicle have that kind of self inspection on landing? It can tell you how it feels?

Mr. Payton: That's called vehicle health monitoring. Some subsystems on this bird do have that.

Question: That's the first time this kind of hardware's flown, right?

Mr. Payton: Well, things like F-16s and 777s and those kind of birds have that.

Question: Aviation Week.

Sorry, but somebody raised a very interesting question. If you've got a launch that's on an expendable vehicle, how do you get the responses, the benefit of responsiveness if you've still got to stick it on top of an Atlas or a Delta?

Mr. Payton: What you've got to do is then again if it's an urgent warfighter need that you're going to go off and do, you're going to go off and satisfy, you're going to preempt the people who are currently assigned to Atlases and Deltas. That's what would happen.

Question: Where does the reusability help you there? You could preempt and get the facing off expendably, couldn't you?

I'm not sure where you get the benefit of reusability if you're going to be having to launch on an expendable vehicle.

Mr. Payton: Again, the access, the earth to orbit launch, I would love to have a higher flight rate of Deltas and Atlases. It would make each one less expensive. But again, the reusability is you get to bring that payload back home and again you have to launch it again to be sure, which could be launched into a different inclination and altitude on subsequent launches.

Reusability is beneficial in two regards. One is sort of total mass to low earth orbit, where you've got a large flight rate for a large number of pounds to low earth orbit over the course of a year. And I learned this back on X33 and X34, the nation doesn't really have enough mass to low earth orbit to justify that. But when you're talking about a surge -- or another way to justify reusability is in a surge mode where you've got to deploy a lot of things rapidly. And that's where reusability benefits in a surge mode. Again, in that ORS one of the missions of ORS is a surge or a replenishment capability.

Question: That still means, you already get that benefit. You've got a reusable launch vehicle, not a reusable upper stage.

Mr. Payton: The upper stage is kind of part of the launch vehicle, too.

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